

WHAT IS CLAIMED IS:

1. An image processing method for smoothing digital data for an input image and for removing noise included in the digital data, the method comprising:

5       an edge information calculation step of extracting an edge of the image from the digital data, and calculating edge information including a grade and a direction of a slope of the edge;

10      a filter information selection step of selecting filter information that is set in advance based on the edge information obtained at the edge information calculation step; and

15      a processing step of smoothing the digital data based on the filter information selected at the filter information selection step.

2. The image processing method according to claim 1, wherein, at the filter information selection step, when the grade of the slope is small, filter information is selected whose smoothing range describes a circular shape, and when the grade of the slope is large, filter information is selected whose smoothing range describes an elliptical shape.

3. The image processing method according to claim 1, wherein, at the filter information selection step, filter information is selected for which the direction of the slope corresponds to the inclination of the smoothing range.

4. The image processing method according to claim 1 further comprising:

a smoothing strength calculation step of calculating luminance using the digital data, and calculating a smoothing  
5 strength using the luminance,

wherein, at the filter information selection step, filter information is selected that corresponds to the edge information obtained at the edge information calculation step and the smoothing strength obtained at the smoothing strength calculation step.

10 5. An image processing method, for smoothing digital data for an input image and removing noise included in the digital data, the method comprising:

15 an edge information calculation step of extracting an edge of the image from the digital data, and calculating edge information that includes a grade and a direction of a slope of the edge;

20 a filter information generation step of generating filter information based on the edge information obtained at the edge information calculation step; and

a processing step of smoothing the digital data based on the filter information generated at the filter information generation step.

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6. A recording medium storing a computer program for causing an image processing apparatus, which includes an input unit

for entering image data, a processor for processing digital data output by the input unit and a recording unit for recording filter information used to process the digital data, to smooth digital data for an input image and to remove noise included  
5 in the digital data, the image processing apparatus being caused by the computer program to perform:

an edge information calculation step of extracting an edge of the image from the digital data received from the input unit, and calculating edge information including a grade  
10 and a direction of a slope of the edge;

a filter information reading step of reading out specific filter information stored in the recording unit based on the edge information obtained at the edge information calculation step; and

15 a processing step of smoothing the digital data based on the filter information read at the filter information reading step.

7. The recording medium according to claim 6, wherein the  
20 filter information read at the filter information reading step is so set that when the grade of the slope is small, a smoothing range describes a circular shape, and when the grade of the slope is large, the smoothing range describes an elliptical shape.

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8. The recording medium according to claim 6, wherein filter information read at the filter information reading step is

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so set that a inclination of the smoothing range corresponds to the direction of the slope.

9. The recording medium according to claim 6, wherein the  
5 image processing apparatus is caused by the computer program to further perform:

a smoothing strength calculation step of calculating luminance using the digital data, and of calculating a smoothing strength using the luminance,

10 wherein, at the filter information reading step, specific filter information is read out from the recording unit based on the edge information obtained at the edge information calculation step and the smoothing strength obtained at the smoothing strength calculation step.

15 10. A recording medium storing a computer program for causing an image processing apparatus, which includes an input unit for entering image data and a processor for processing digital data output by the input unit, to smooth digital data for an input image and to remove noise included in the digital data, the image processing apparatus being caused by the computer program to perform:

an edge information calculation step of extracting an edge of the image from the digital data, and calculating edge information that includes the grade and the direction of a slope of the edge;

a filter information generation step of generating filter

information based on the edge information obtained at the edge information calculation step; and

a processing step of smoothing the digital data based on the filter information generated at the filter information generation step.

11. An image processing apparatus comprising:

an image input unit for receiving image data and outputting the image data as digital data;

10 an edge calculation unit for extracting an edge of an image from the digital data output by the image input unit, and for calculating edge information that includes the grade and the direction of a slope of the edge;

15 a recording unit for storing filter information that is set in correlation with the edge information;

a filter information selection unit for, based on the edge information calculated by the edge information calculation unit, selecting filter information stored in the recording unit; and

20 a smoothing unit for smoothing the digital data based on the filter information selected by the filter information selection unit.

12. An image processing apparatus according to claim 11,  
25 further comprising:

a smoothing strength calculation unit for calculating luminance using the digital data, and calculating a smoothing

strength using the luminance,

wherein, on the recording unit, filter information is stored that is set in correlation with the edge information obtained by the edge information calculation unit and the 5 smoothing strength obtained by the smoothing strength calculation unit.

13. An image processing apparatus comprising:

an image input unit for receiving image data and outputting

10 the image data as digital data;

an edge calculation unit for extracting an edge of an image from the digital data output by the image input unit, and calculating edge information that includes the grade and the direction of a slope of the edge;

15 a filter information generation unit for generating filter information stored in the recording unit based on the edge information calculated by the edge information calculation unit;

a smoothing unit for smoothing the digital data based 20 on the filter information generated by the filter information generation unit; and

a recording unit for storing the smoothed digital data.